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Geothermal conversion of organic matter in the carbonaceous medium of the presence of homogeneous oxidation catalysts

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Abstract

© SGEM2017 In this research the regularities of heavy oil conversion in supercritical water and the presence of finely dispersed caustobioliths and metal oxides were shown. The process of thermo-catalytic conversion was carried out in a closed reactor under temperature and pressure conditions, providing the transition of the aqueous phase in supercritical fluid. To investigate the selectivity of catalysts, different compositions of catalyst systems were prepared and studied for their effectiveness in the process of degradation of high-molecular hydrocarbon raw material. The conversion process of forming and initiating compounds, acting as a donor of a proton allows to block free radicals of high-molecular hydrocarbon and saturate the unsaturated hydrocarbons formed by cracking reactions. At the same time it helps to inhibit the reaction of consolidation of aromatic macromolecules that prevents the coke formation. The hydrogen protons also promote the hydrogenation reactions behavior in the crude oil. In accordance to the above, dispersed caustobioliths and active carbon were included in the composition of the initiation additives. Set of experiments of were carried out on conversion product, which enabled to follow the transformations of all components of the reaction medium under supercritical conversion conditions. The regularities of changes of the component, structural-group, fractional and elemental heavy oil compositions were discovered as a result of the conversion under the above conditions. The rheological characteristics of the crude oil and converted oil were studied. High molecular weight components of crude oil were destroyed with the formation of light distillate fractions as the result of aquathermolysis in the supercritical water conditions and with the presence of initiator additives. Such light distillate fractions are practically not presented in the crude oil. The conversion of various samples comes to ratio from 18 to 29%. The significant reduction in the viscosity of the converted oil is up to 96% compared to the crude oil.

Keywords

Aquathermolysis, Converted oil, Heavy oil, Rheological curve, Supercritical water

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